No. 638,610. Patented Dec. 5, 1899.

H. H. THORNTON.

PLANING MACHINE.

(Application filed June 2, 1899.)

(No Model.)

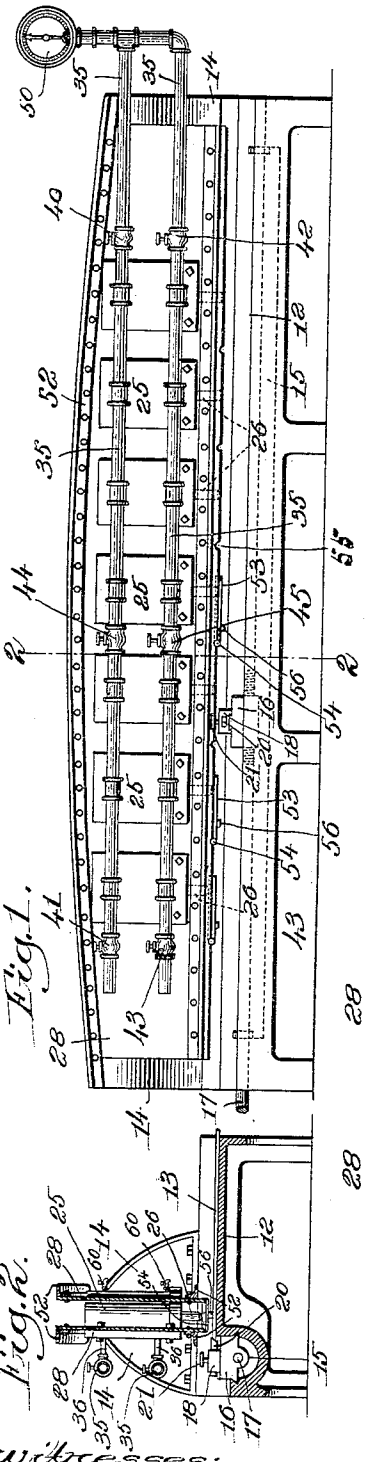


Fig. 1.

Fig. 2.

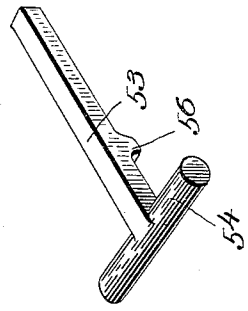


Fig. 5.

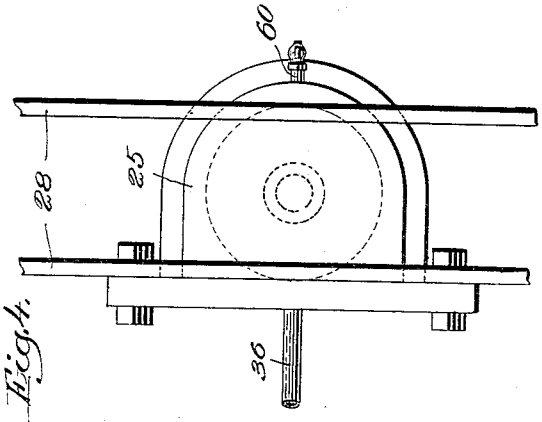


Fig. 4.

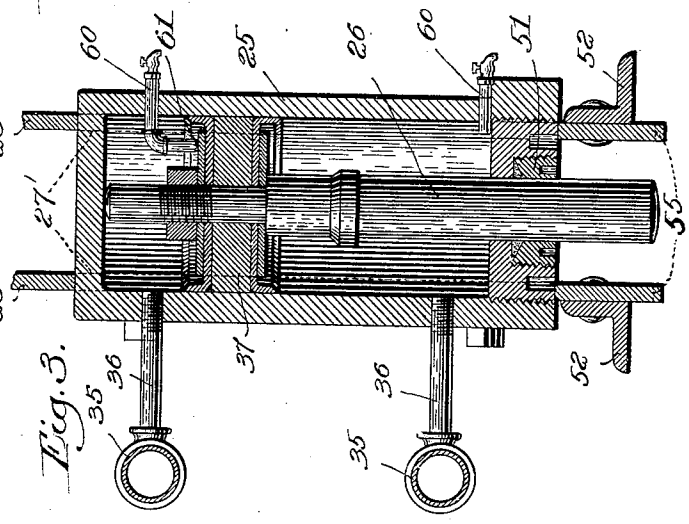


Fig. 3.

Witnesses:
Fred L. Grundel.
Adolf C. Kaiser.

Inventor
Henry H. Thornton,
by Dewey & Gregory Attys.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

HENRY H. THORNTON, OF CAMBRIDGE, MASSACHUSETTS, ASSIGNOR TO THE ROBERTS IRON WORKS COMPANY, OF SAME PLACE.

PLANING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 638,610, dated December 5, 1899.

Application filed June 2, 1899. Serial No. 719,067. (No model.)

To all whom it may concern:

Be it known that I, HENRY H. THORNTON, of Cambridge, county of Middlesex, and State of Massachusetts, have invented an Improvement in Planing-Machines, of which the following description, in connection with the accompanying drawings, is a specification, like figures on the drawings representing like parts.

This invention relates to a metal-planing machine; and the object of the invention is to provide an effective apparatus of this character primarily intended for finishing or planing the edge of a plate of metal and involving means for firmly holding the plate upon the bed of the machine while a cutting or planing tool reciprocatory upon the bed is operating upon the plate.

In metal-planing machines where a heavy plate is sustained upon a bed or other base a series of screws have ordinarily been relied upon to clamp the plate in position, these screws being arranged at predetermined intervals along the machine and being separately tightened by hand. The first of those that were tightened would be loosened before the final ones were reached, thereby permitting lateral play of the plate, and consequently the formation of an uneven or ragged edge, which, as is obvious, is decidedly objectionable. By my improvements, however, the disadvantage pointed out is not possible, for I provide a series of fluid-controlled holding devices operable absolutely in unison and exerting simultaneously even pressures upon the plate or stock or work at equidistant points along the same near the edge to be planed, and as a means for securing the highest efficiency I prefer to employ a single source of fluid-supply for actuating all of the fluid-controlling devices simultaneously. While a series is preferably used, a large number being generally in the same, it is obvious, of course, that the invention is not so limited, for one of said fluid-controlling devices could be employed for clamping a narrow or short plate to the bed of the machine. Any convenient type of fluid-controlled instrumentalities may be employed for securing the peculiar advantage, and each of them includes, preferably, an air-cylinder, the pistons of which constitute work-holders, and I not only utilize the air-pressure to force the pistons into working or clamping position, but employ the same for returning the pistons to their ineffective or normal positions, the piping connecting the battery of cylinders being such as to properly control the supply and exhaust from them in alternation. For the purpose of securing the best results, therefore, I employ a battery of fluid-containing cylinders, and in connection therewith means are provided for separating the battery into divisions of any suitable numner in each division or set.

Figure 1 is a front elevation of a planing-machine constructed in accordance with my invention. Fig. 2 is a transverse section of the same, taken in the line 2 2, Fig. 1. Fig. 3 is a longitudinal central section of one of the cylinders. Fig. 4 is a plan view of the same, and Fig. 5 is a perspective view of a lever employed for multiplying the effect of a piston.

The framing for supporting the different parts of the apparatus may be of any suitable character, and it involves in its construction a bed or table 12, upon the flat upper surface of which the plate of sheet metal 13 is to be clamped to have its edge planed or finished by a suitable tool, and the bed or platform 12 is suitably joined to the substantially duplicate end members 14, constituting a part of the framing, and which rest upon a floor or other foundation. The framework has just forward of the bed a suitable groove or runway 15, in which the carriage 16 is disposed, said carriage being suitably supported and being operated backward and forward through the agency of the well-known lead-screw 17. The carriage is equipped with a post or standard 18, carrying a suitable tool 20, held in firm contact with the edge of the plate by means of a set-screw 21 on the standard or post 18, said set-screw also controlling the feed longitudinally of the tool toward and from the work. On the traverse of the carriage 16 with the tool 20, engaging the edge of the work, such edge will be finished to the proper extent.

As hereinbefore set forth, clamping-screws are generally relied upon to hold the plate 13

to the work table or bed 12; but they are not efficacious, since being in large number one or more of them always loosen to such an extent as to permit objectionable motion of the platen, which produces, of course, an uneven or ragged edge on said plate; but my invention includes the provision of a plurality of devices which act absolutely simultaneously and cannot be dislodged from their working positions, and in this case the work or plate can have no movement whatever near the edge to be dressed, and these devices being fluid-controlled and simultaneously operable can be governed readily by a single attendant. The separate holding devices each include a cylinder, as 25, and in Fig. 1 I have represented a series of seven of these cylinders, the pistons 26 thereof being simultaneously operative to act against the plate 13 to hold the same firmly in position upon the bed 12, and the said cylinders are sustained in alined apertures 27′, formed in the parallel vertical plates 28, extending entirely along the machine and being secured to the side standards or uprights 14 and also to the top or cross bar 29, fastened at its opposite ends to said standards or uprights, and the lower ends of the parallel plates are located a short distance above the upper surface of the bed 12, for a purpose that will hereinafter appear. The successive cylinders fit snugly in the registering slots or apertures 27′, formed in the longitudinal parallel plates 28, the latter constituting a simple means for supporting the cylinders in horizontal alinement along the machine. The respective cylinders 25 are supplied with fluid from a suitable source of supply through the horizontal parallel pipes 35, said pipes being provided at intervals along the same with branch pipes 36, located one above the other and adapted to supply fluid, which in the present case is air, at opposite sides of the piston 37 for the purpose of operating said piston, and consequently the piston-rod 26, and at one time one of the pipes 35 serves as a supply-pipe, while the other one serves as an exhaust-pipe, and at another time these functions are reversed.

In Fig. 3 the piston 37 is represented as occupying its normal or upper position, and for the purpose of forcing the piston-rod 26 downward, whereby it can act against the plate or stock 13, air will be admitted through the upper pipe 35 and from thence through the branch 36 into the upper part of the cylinder 25, thereby forcing the piston 37 downward, and any air that may be in the cylinder 25 below the piston will be exhausted through the lower branch pipe 36 and the lower main pipe 35. To elevate the piston 37 for releasing the plate 13, this operation will be of course reversed, the lower pipe 35 acting as the supply one, while the air is exhausted through the upper pipe.

The upper pipe 35 is provided with hand-valves 40 and 41, while the lower pipe is equipped with similar valves 42 and 43, and these several valves may be of any suitable kind capable of controlling the supply and exhaust of the fluid. The valves 40 and 42 are located one above the other at one end of the battery of cylinders, while the valves 41 and 43 are similarly disposed at the opposite end of the battery, and it will be assumed that it is desired to depress the pistons 37 for the purpose of throwing the piston-rods 26 into clamping position. In this case the valves 42 and 41 will be closed and the valves 40 and 43 will be opened, and the air or other fluid will pass through the upper pipe 35, which connects with all of the cylinders and will simultaneously force all of the pistons 37 downward, any air that may be in the cylinders being exhausted through the lower pipe 35, the left-hand or what is for the time being the exhaust controlling-valve 43 being open.

I have represented a battery of seven cylinders and have described the same as being simultaneously operative; but at times it is not necessary to use all of them, and in this case I provide each pipe between the valves 40 and 41 and 42 and 43 with valves, as 44 and 45, respectively, which are located between the fourth and fifth cylinders in the series, thereby forming two divisions, four cylinders being in one set and three in the other. To use the first four cylinders of the series, the valves 42 and 44 will be closed and the valves 40, 45, and 43 opened, whereby the incoming air can depress the pistons 37, the air being exhausted, of course, through the lower pipe 35. To reverse this operation or to elevate the four pistons 37 in unison, the valves 40 and 45 will be closed and the valves 42, 44, and 41 opened, thereby admitting air through the right-hand end pipe 45 into the proper cylinders below the pistons for elevating the latter, the exhaust being then through the upper pipe 35 to the left of the right-hand valve 40.

A pressure-gage, as 50, of some suitable type is connected with the piping and serves its usual function.

The piston-rods 26 constitute in effect plungers or holding devices and are located at relatively close intervals, so as to firmly secure the plate for operation by the planing mechanism, and while they may act directly against said plate I prefer to interpose between said parts power-multiplying mechanism of suitable character, thereby securing the highest degree of efficiency, and a type of such power-multiplying instrumentalities will be hereinafter described.

The upper heads of the cylinders are closed, while the lower heads thereof (designated by 51) are in the form of stuffing-boxes in threaded engagement with the cylinders.

It will be remembered that the plates 28 constitute a support for the battery of cylinders 25, and said plates serve a second office, they constituting a fulcrum device and being for stability connected by bolts with the channel irons or bars 52, running lengthwise of the

machine and secured to the end standards or uprights 14.

In connection with each piston rod or plunger 26 I provide a power-multiplying device, such as a lever 53. These levers have journal portions or trunnions 54, adapted to fit in semicircular seats or bearings 55, formed transversely in alinement in pairs along the under side of the plates 28, and the free ends of the levers are disposed under the lower ends of the piston-rods or plungers 26 and are adapted to be engaged thereby, and said levers have upon the under sides thereof the offsets or lugs 56, adapted to fit against the upper surface of the plate or other object to be held, and the disposition of the journal portions 54 relative to the tails or free ends of the levers 53 is such that when said free ends are engaged a very powerful force will be applied through the offsets 56 to the plate, and I find these levers very effective in practice, although it is obvious that they may be dispensed with, in which case the piston-rods would bear directly against the object to be clamped.

The cylinders are provided with draw-off pipes 60, each governed by a valve or cock, and by opening which any water that may be contained within the cylinder, due to the humidity of the air, can pass off through said discharge-pipes, said pipes being located one above the other and passing through the wall of the cylinder. The upper pipe, which is engaged by the piston 37 when the same reaches the limit of its upper stroke, is serrated, as at 61, thereby preventing the complete stoppage of said pipe by the piston.

The pistons of course are provided with packings or glands to insure tight fits within the several cylinders, as usual in this kind of devices.

The invention is not limited to the precise details nor to the relative arrangement of parts hereinbefore set forth, for these can be variously changed within the scope of the appended claims.

While I prefer to employ fluid-controlling means, it is evident that my apparatus is not limited to the use of any particular source of energy, and it will be understood that the said apparatus includes, broadly, a bed, a series of clamping devices having a plate supported on said bed, and means controlled from a single source of energy for actuating said clamping devices in unison.

It will be obvious from the preceding description that while the several plungers or clamping devices are simultaneously lowered they are also elevated in unison, which is advantageous, for they are carried to a point out of the path of a plate to be introduced between their lower ends and the bed of the machine, by reason of which the plate cannot strike any of said clamping devices to bend or otherwise injure the same, as is frequently the case with the old type of clamping mechanism, where frequently one or more of the screws are left projecting in the path of the plates. It will be understood also that the peculiar clamping devices are not limited in this application to a planing-machine, this title being adopted as a generic one to cover different types of apparatus wherein work can be clamped to a base or bed for operation.

Having fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a planing-machine, a bed, a series of cylinders each having a piston, two pipes connected to each cylinder above and below the pistons and constituting alternately supply and exhaust pipes, and each pipe having valves at its ends, clamping devices connected to the respective cylinders and movable in unison either forward or backward by the pressure of a fluid acting against the same, and valves carried by each pipe and adapted to separate the cylinders into two divisions whereby one division may be operated without operating the other division.

2. In a planing-machine, a bed, a cylinder having a piston, a rod connected to said piston and constituting a clamping device, a framing for supporting said cylinder, a lever in position to bear against the framing and also against the work supported upon said bed, and the free end of the lever being located for operation by the rod, and means for supplying fluid to the cylinder for operating the piston therein and for also controlling the exhaust.

3. In a planing-machine, a bed, a cylinder having a piston, a rod connected to said piston and constituting a clamping device, a lever provided with a journal fitted in a seat in the framework and having an offset adapted to engage a plate on the bed, and one end of said lever being located to be engaged by the rod, and fluid supply and exhaust controlling means for said cylinder.

4. In a planing-machine, a pair of plates having registering openings, a cylinder fitted in said openings and containing a piston, a rod connected to the piston and constituting a clamping device, a lever provided with journals adapted to fit in seats or bearings formed in the plates, and said lever being adapted to bear against a plate or work upon the bed and to be engaged and operated by said rod.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HENRY H. THORNTON.

Witnesses:
HEATH SUTHERLAND,
FREDERICK L. EMERY.